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United States Patent [19]

Lynch

[11] **Patent Number:** **6,002,916**[45] **Date of Patent:** **Dec. 14, 1999**[54] **SPACE-BASED SERVER NETWORK
ARCHITECTURE**[75] **Inventor:** William Charles Lynch, Los Altos,
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Sunnyvale, Calif.[21] **Appl. No.:** 09/027,838[22] **Filed:** Feb. 23, 1998[51] **Int. Cl.⁵** H04Q 7/00[52] **U.S. Cl.** 455/13.1; 455/13.2; 455/12.1;
455/427[58] **Field of Search** 455/13.1, 13.2,
455/12.1, 427, 428, 429, 430; 244/164,
158 R; 342/352[56] **References Cited****U.S. PATENT DOCUMENTS**

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[57] **ABSTRACT**

A space-based server network architecture (1) which permits on demand transfer of mission and control data between client satellites (14) in an orbit about earth and an earth station (20, 22, 24, 26) irrespective of the location of the client satellite (14) relative to the earth station (20, 22, 24, 26). The architecture includes a plurality of server satellites (10) located spaced apart in a earth orbit above the orbit of the client satellites (14). The server satellites (10) provide substantially total world-wide communications coverage to and connectivity with designated and authorized earth stations (20, 22, 24, 26) and the plurality of client satellites (14). Each server satellite (10) includes: a communications downlink (18, 18a, 18b) for providing intercommunication with designated and authorized earth stations within its field of view; communications crosslinks (12, 12a, 12b) for providing intercommunications with other server satellites within its field of view; and communications links (16, 16a, 16b) for providing intercommunication with a client satellite within its field of view. Client satellite control data originating from an earth station is passed directly to an accessible server satellite, which then passes the control data either directly to the intended client satellite if within its communications field of view, or forwards the control data to a server satellite having direct communications access to the intended client satellite. Mission data from a client satellite can at any time be transmitted to a designated earth station, irrespective of its location on earth, by transmitting first to a server satellite within its communication field of view, where the mission data is then either downlinked directly to the designated earth station if within its communications field of view, or transmitted to a server satellite having communications downlink access to the designated earth station.

18 Claims, 4 Drawing Sheets